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Division of Wildlife Refuges

Narrative Report Routing Slip

Refuge SHIAWASSEE Year 1964

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Shiawassee National Wildlife Refuge

Annual Narrative Report

1964

Personnel

John R. Frye	-	Refuge Manager
John W. Ellis	-	Asst. Refuge Manager (Trans. 7/7/64)
Edward W. Anderson	-	Asst. Refuge Manager (EOD 9/9/64)
S. Sam Poma	-	Refuge Clerk
Louis D. Robinson	-	Heavy Duty Mechanic
James R. Mayle	-	Operator General (Heavy)
Kenneth H. Shelley	-	Operator General (Light)
Amos B. Snider	-	Maintenanceman

Temporary Personnel

Randall Gosen	-	Laborer
Robert Majewski	-	Laborer
William C. Gasaway	-	Wildlife Aid

United States Department of the Interior

Fish and Wildlife Service

Bureau of Sport Fisheries and Wildlife
Shiawassee National Wildlife Refuge
6975 Mower Road
Saginaw, Michigan 48601

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I. GENERAL

A. Weather Conditions.

	Snowfall	Precipitation This Month	Precipitation Normal		Max. Temp.	Min. Temp.
January	1.5	.88	1.11		52	-10
February	3.7	.28	1.76		51	5
March	7.5	2.13	1.28		62	12
April	1.8	2.67	3.35		85	16
May		1.27	3.08		90	35
June		2.04	3.89		97	38
July		4.34	3.56		95	48
August		3.79	2.74		98	41
September		3.14	2.39		91	32
October	T	.64	3.54		80	21
November	3.8	1.46	3.93		74	14
December	8.9	1.40	1.75		48	- 2
Total	27.2	24.04	32.38	Extremes	98	-10

Near normal temperatures with below normal precipitation continued throughout the year. Snowfall was limited and at no time during the year was snow accumulation a problem as periodic snowfalls were generally followed by warmer temperatures and rain. During the latter part of June new record high temperatures were recorded but over most of the summer average temperatures were slightly below normal. The drought conditions in Michigan reported last year continued through 1964, with annual precipitation more than eight inches below normal. Rainfall received during the growing season was near normal and occurred at just the right times to favor excellent crop yields.

B. Habitat Conditions.

1. Water. Run-off from the snow melt was slight and with the below normal spring precipitation there was no flood hazard in 1964. Low water levels in the main rivers limited the use of the pumps and it was not possible to raise pool elevations to approved elevations until early summer. Levels in Pool 1a were held at slightly below approved elevation during the summer by pumping the water from Pool 1b into Pool 1a through the goose pen when Pool 1b was in drawdown in June and July.

Pool 1b was dewatered, starting in May, and dry enough to permit development work to be started by July 1. Following completion of planned work, the pool was reflooded on schedule in August and neared approved elevation by mid-September prior to arrival of the fall migrants.

Continued pollution from detergents in the Flint River was in evidence as banks of suds formed at pump outlets. In April an agreement was reached between the Bureau, U. S. Public Health Service and Michigan Water Resources Commission to determine the extent of the detergent problem, and to formalize methods to resolve the problem. Water samples were obtained periodically at designated sampling stations, by the Water Resources Commission, to define the rate of detergent accumulation. To date we have not been furnished a report on the sampling results. It has been agreed that little can be done to solve the problem until legislation is passed banning use of non bio-degradable detergents.

As a sidelight, a recent report issued by the Corps of Engineers stated that Lakes Huron and Michigan were, at the end of 1964, at the lowest levels in the 104 years lake levels have been recorded.

2. Food and Cover. Food and cover was generally unrestricted during the year. During the winter, the light snow cover made supplemental foods in refuge croplands readily available to deer and upland game birds. Spring migrant waterfowl fed almost entirely on waste corn, and refuge shares of corn that had been chopped with a rotary mower after standing over winter. As the marsh opened up the waterfowl began feeding on natural foods as the year progressed.

Natural food and excellent cover conditions prevailed in Pool 1a during the summer. The resident goose flock fed mainly on young growth of cultivated crops on the refuge until Pool 1b was dewatered. Seedings of millet, buckwheat and barley, plus luxuriant growth of spike-rush, smartweed, and annuals on the dry pool bottom, was attractive to brooding geese, and the flock moved in and fed there exclusively during most of the summer.

Continued heavy utilization of Pool 1b by feeding ducks and geese was observed through early September, when feeding flights to the croplands stepped up. During the fall the ducks fed on and completely utilized crop residues from barley and soybeans, and continued to the corn as the harvest progressed. Geese fed heavily on new growth of winter wheat as it came up. In early September the geese again moved into the sugar beets as the

harvest started and fed exclusively on beet residues until the corn harvest was underway. At the close of the year, the remaining ducks and geese are feeding entirely on corn left after harvest. The refuge share of the corn was again left standing to be chopped down in the spring to provide food for migrant ducks, geese and swans.

II. WILDLIFE

A. Migratory Birds.

Whistling Swans. The first spring migrants were observed on March 8 with the arrival of 12 swans in Pool 1a. The peak population of 500 was reached by March 21 and remained on the area through April 4. Swans started pulling out during the week of April 11 and the last of the migrants had departed by April 18, except for two apparently sick swans that were observed until mid-May. Swans fed in corn stubble when first arrived but moved into the pool as the ice went out and the major feeding was on natural foods in Pool 1b prior to departure. The swan trapping program is reported under Section V. The fall migration of swans appeared normal, with the usual few observations. Two swans were present in Pool 1b for a two week period October 25 through November 4.

Geese. Canada geese were first observed on March 2 when 340 returned to the refuge. Numbers increased rapidly until the peak population of 15,000 was reached on March 28. No Snow geese and only a few Blue geese were observed on the area in the spring. The geese started moving out early in April and by April 25 only the resident nesting flock remained. Feeding by the spring migrants was almost entirely on corn and winter wheat available on refuge croplands.

After the migrants moved on, the resident flock numbered about 200 geese. Nesting activities were underway immediately, with the major activity again concentrated in Pool 1b. 35 nests were located during the nesting survey with an estimated 150 goslings hatched. Nesting and production information is included in Section V. The resident flock, augmented by goslings, fed primarily in refuge croplands in farm unit 121 until Pool 1b was dewatered in June. The geese then moved into the dry pool bottom for food and cover during the rest of the summer, feeding on new growth of barley and volunteer annual plants.

The first fall migrants arrived the week of September 19, increasing population to 1,200 Canada geese. Continued gradual influxes raised the population to a peak of 6,900 on November 21. Numbers remained constant until gradual southward movements occurred during the first week of December. There are 360 geese still on the area at the end of the year.

Snow geese and Blue geese were first seen on October 2 and reached a peak of 625 by November 10. Last migrants departed the first week of December. White-fronted geese were not observed in 1964.

The major feeding activity was confined to barley and wheat stubble early in the period. As the sugar beet harvest started in early September most of the geese started to feed extensively on beet residues, as was first observed here in 1963. The geese continued to feed on sugar beets and winter wheat until the corn harvest was initiated in November, and have fed on corn since that time.

It has been suspected that the heavy hunting pressure in the refuge area has limited fall goose use in past years. Fall population peaks had stabilized at 3,000 to 4,000 geese while spring use has been increasing annually, to a high of 24,000 in 1963. In addition, hunting the refuge periphery has accounted for annual losses of up to 90% of the goslings hatched each year. The Michigan Department of Conservation closed a large area to goose hunting for three years, beginning with the 1964 season, to alleviate this situation. The closed area includes all lands of the Shiawassee Refuge and adjoining Shiawassee River State Game Area plus an extensive buffer strip of private lands surrounding the project. While a positive conclusion as to success of this action is not possible after only one year, it looks promising. The 1964 peak fall goose population was 7,500, an increase of 97.4% over 1963, and fall goose use days were up 104% over the 1963 fall total. The added benefit was that for the first time, the kill of the current year's goslings was slight, if any, in this area. Hunters generally respected the closed area and the known illegal goose kill was four Canada geese and two Blue geese, with an estimated total goose kill in the closed area of only 15.

Ducks. The first migrant ducks moved into the refuge on March 2, with observations recorded for Mallard, Black duck, Pintail, and Wood duck on that date. Ring-necked ducks and Goldeneyes were seen on March 4; Green-winged Teal on March 5; Baldpates on March 6; Lesser Scaup on March 9; Common Mergansers, Shovelers, and Buffleheads on March 10; and all other common species present by March 19. The peak spring population, 33,200, was recorded the first week of April. Migrants had moved on by the first week of May and the summer population stabilized at about 700 birds.

The first broods were observed on June 1. During July brood counts, 39 broods were tallied with estimated total production of 584 ducks, a new record for the station. Actual broods observed included 10 Mallards, 1 Black duck, 1 Green-winged Teal, 1 Pintail, 11 Blue-winged Teal, and 15 Wood ducks.

Gradual increases in duck populations began early in August with a buildup of molting birds. As migration began in the middle of August numbers increased to 16,000 when the hunting season opened and a fall

peak of 28,500 on November 20. This number remained fairly constant until a general freeze that moved most of the ducks on during the first week of December. An estimated 400 Mallards and 175 Black ducks remained on the refuge at the end of the year.

Major feeding activity was on millet and smartweed in Pool 1b after reflooding early in the fall. As the crop harvest progressed the feeding habits changed to cultivated crop residues, primarily soy beans, barley stubble, and corn. Feeding flights to corn fields became common by mid-November. Ample food was available on refuge lands this year, and off refuge flight to the Big Prairie Farm were much less common than in past years.

Good to excellent hunting opportunities were present on public hunting areas in the State Game Area and on private lands, but hunting pressure was light and kill low, probably due to the area being closed to goose hunting.

Coots and Gallinules. A single Coot was observed on March 9. The peak spring population, 800, was recorded on April 30 and numbers declined to estimated summer nesting population of 300 by May 10. The first brood was observed on June 1 and production appeared excellent, with IA broods observed as late as July 3. July brood counts totalled 75 broods of Coots with estimated production of 250. Numbers of Coots using the area declined during August to a total of 150 birds and then increased to a fall peak of 300 on October 31. The last observation of Coots was recorded on November 20.

Common Gallinules were first seen on April 27 and peaked at 35 birds during the summer. Six broods were seen during the summer months, a new high for this species.

Other Water Birds. Arrival dates for other marsh birds were spread out over an extended period. Great Blue Herons, March 14; Pied-billed Grebe, March 17; Green Heron and Eared Grebe, April 20; Black-crowned Night Heron and Sora Rail, April 23; Horned Grebe, April 25; and American Bittern, April 28. All species were present in normal numbers during the year. The first brood of Pied-billed Grebes was observed on June 1, and production appeared to be somewhat higher than normal. Nesting colonies of Great Blue Herons and Green Herons were active at the same locations as in past years. All marsh birds were commonly observed through early fall with last observations recorded in late October and early November.

Shorebirds, Gulls and Terns. Recorded first spring observation dates are as follows: Herring Gull and Ring-billed Gull, March 9; Killdeer, March 14, Black Tern and Spotted Sandpiper, April 28; Greater Yellowleg, May 8; Solitary Sandpiper, May 11; Black-bellied Plover, May 18; and Red-backed Sandpiper, May 21. Water conditions on the refuge were

not favorable for shorebirds and numbers were few during the migration periods. Black Terns again nested in the Pool 1 and were last seen in late August. All species had pulled out by the end of October except the gulls, which are still present in small numbers at the end of the year.

B. Upland Game Birds.

Ring-necked pheasants remained at a low level throughout the year. Most common habitat of observation was Farm Unit 121 and 122 near the pool areas. An estimated 100 birds were using the refuge during the period, with a sex ratio of 1:1. Four broods seen in late May and June were the only indications of reproduction. The past year produced a decrease of about 25 percent in some of the better pheasant concentration areas in the state of Michigan that are located near the refuge.

C. Big Game Animals.

White-tailed deer were commonly observed throughout the year. The estimated population is about 350 animals with a sex ratio of approximately 1:10. Production appeared to be high with the sightings of several groups of triplet and twin fawns per adult doe. Single fawn and doe combinations were rarely observed. During the hunting season, the deer concentrated in the closed area, particularly Farm Units 121 and 122. On November 24, 1964, 206 deer were counted in the closed area.

White-tailed deer have started to compete to a small extent with Canada geese for available food during the late fall months. A special doe permit season under State of Michigan regulations may be necessary to hold the population in balance with the capacity of the land in future years.

D. Fur Animals, Predators, Rodents and Other Mammals.

A relatively stable population of muskrats was apparent in 1964. Although a specific population estimate is unavailable at this time, the population appears to be at an optimum level. The breakup of dense stands of cattail, providing a beneficial edge effect, without serious damage to dikes has occurred in the past year.

Beaver continued on the increase in population. The majority of houses are located in Pool 1a. Their activities also continue to be beneficial by cutting undesirable cottonwood trees and willows along dikes and ditchbanks near the houses. A controlled beaver harvest may be needed in the future if their activities and population become destructive.

Mink and weasel populations remain low. No observations of either species were made during the year.

Raccoons, considered the number one predator on the refuge, were approximately equal in number to last year. Known predation on waterfowl nesting was not indicated, but waterfowl banding was hampered to a certain extent. Wood duck banding by the use of floating walk-in traps had to be terminated after losses of waterfowl occurred and a solution to the problem was not available.

Two active red fox dens were located along the Center Dike. One den was housed in an abandoned muskrat burrow high on the dike built during high water levels. The population appears to be at a stable level, with no threat to waterfowl populations. Red fox were occassionally observed on the refuge attempting to chase Canada geese but were very ineffective. It appears that their role in the present population status is to remove diseased and injured birds from the refuge waterfowl populations.

E. Hawks, Eagles, Owls, and Crows.

Marsh hawks, red-tailed hawks, sparrow hawks, Cooper's hawks, and turkey vultures were seen frequently throughout the year. American rough-legged hawks are winter residents. Two bald eagles, one adult and one immature, were observed almost daily south of the south (1b) pool during March, April, and May. One immature bald eagle was seen occasionally during fall and winter.

Great horned owls, short-eared owls, long-eared owls, and screech owls were common. One great horned owl was destroyed in a Conibear trap set at a wood duck banding site for raccoons (see Section II, F). This was the only indication of possible predation on waterfowl by this species.

Last spring observation on snowy owls was March 22 and the first fall observation was made November 4. A snowy owl was seen regularly in the months of November and December along the Center Dike and was observed once feeding on a mallard carcass in an open farm unit.

Crows moved through the area on March 9 when 300 birds were observed. There was no major movements in the fall and winter resident population is approximately 50.

F. Other Birds. No unusual observations this period.

G. Fish.

Carp were in over-abundance in the pools and ditches during the year. A sizeable population of northern pike (16" - 26") was found in Pool 1b during the drawdown. Approximately 300 pike along with about 25 crappies were salvaged from the south pool (1b) and were released into Pool 1a.

H. Reptiles.

Fox and garter snakes were the most common snakes on the refuge. Two species of turtles were identified for the first time and added to the refuge list. They are the Blandings turtle and the Map turtle.

I. Amphibians.

Bull frog population was about normal. The first call was heard in mid-May.

J. Disease.

Another die-off of waterfowl attributed to botulism occurred in the Saginaw Bay, which is located 15 miles down stream from the refuge. No serious die-off occurred on the refuge. Three Whistling swans died during the spring migration (See Section V. No. 2).

III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development.

1. Dikes and Ditches.

The drainage ditch along Goose Pen Road was cleaned and spoil removed used to fill abandoned portion of ditch west of the field ramp to Farm Unit 122.

Eroded sections of the outside dike from the Old Womans Hole to the old pumphouse were repaired and the dike raised. All fill was hauled in by truck due to lack of fill material along the dike sections repaired. New fill was leveled with dozer and top and slopes seeded to grass.

Recapped east dike of White Marsh and about 1/3 of north dike. This job to be completed in winter of 1965.

Seeding of grasses completed on dike top and slopes of South Dike and that portion of the Misteguay Dike along the west side of the White Marsh. Dikes graded and slopes leveled prior to seeding. One-quarter miles of interior ditch on Tract 125 was cleaned for tile draining.

2. Roads and Trails.

Gravelled South Dike from Center Dike to South Spillway.

Hauled and spread gravel on low level dike in Pool No. 1, and on Pool 1b banding site.

Spot gravelling on interior roads and trails of Tracts 115, 121, and 186.

All roads bladed periodically during spring and summer months.

Gates were constructed and placed at all access points to the refuge.

3. Fencing and Posting.

Two and one-half miles of boundary fence along the south boundary was repaired and/or re-constructed.

Fence lines were dozed out and boundary fence constructed along 2-3/4 miles of east refuge boundary.

Prior to the waterfowl hunting season the entire boundary of present refuge ownership was posted with standard Blue Goose boundary markers for the first time.

Public Hunting Area signs were posted to delineate that portion of the refuge open to deer hunting during the Michigan season.

4. Pool 1b Development.

Drawdown of Pool 1b was started on May 17, as soon as goose nesting activities were completed, and by June 15 the pool was dry except for borrow pits and the lowest areas. The water was removed primarily by pumping Pool 1b water into the goose pen and then released into Pool 1a by gravity flow. This was done to conserve the surplus waters in Pool 1b and assist maintenance of desired elevations in Pool 1a as low river levels made it impossible to pump into Pool 1a from the Ferguson Bayou.

The pool bottom was dry enough to permit use of farm machinery by June 30 and initial cultivation was started on that date. The bare mud flats in the south west corner of the pool were disced and seeded during the second week of July. Seedings consisted of 15 acres of millet-buckwheat mixture and 6 acres of barley. The buckwheat did not mature but the millet produced seed prior to reflooding in August. The resident goose flock grazed the barley continually all summer and kept it mowed to time of reflooding.

Cattail control was completed over much of the pool. The densest stands, with plants up to seven feet tall, were plowed using a breaking plow pulled with the D-4 tractor. This operation turned the cattails under in one operation. Less dense cattail stands and volunteer growth of annual plants were disced down with a "Rome" disc. Smartweed volunteered over most of this

disced area. An excellent seed crop was produced and was heavily utilized by waterfowl following re-flooding of the pool.

Infestations of willows in the high areas of the pool were removed at this time also. Extensive areas in the east end of the pool were removed with the bulldozer, and smaller patches were turned under with the breaking plow and worked up with the "Rome" disc.

Experimental tiling of pool bottom was completed on about 40 acres at the west end of the pool. Tile drainage should speed up future dewaterings of the pool and permit use of equipment on the pool bottom up to 10 days earlier than without the tile drainage. This time element could be the difference between a good seed crop and no crop at all. Observations indicated that reflooding of the west end of the pool was completed sooner than usual this fall as water followed the tile lines, pre-saturating the bottom soils. Water reached the surface and began spreading out from the tile lines several days before flooding was apparent in the east end of the pool. The tiling job consisted of installation of 1,256 rods of tile line, to give a 6 rod interval, and excavation of new ditch along the low level dike to handle flows from tile lines. Spoil from the ditch excavation was spread on the low level dike slopes to repair eroded banks.

Prior to re-flooding, all islands in the pool were rebuilt with the TD-18 bulldozer, and several new islands were pushed up at the same time. Islands were completed to about 8 foot diameter top and six feet high. Costs for this island work are inexpensive. Rebuilding eroded islands took an average of 20 minutes per island, an estimated cost of $2.00 each and new island construction consumed an average time of 45 minutes per island, estimated costs of $4.50 each. In addition, 10 artificial nesting tubs constructed from ends cut from surplus jet engine containers were set out in the pool.

A mound was pushed up, leveled off, and gravelled to provide a cannon-net trapping site adjacent to the low level dike.

4. Pool 2 Development.

The entire area to be contained in new Pool 2, approximately 115 acres, was plowed and seeded to a winter barley variety. Old islands were repaired and four new nesting islands pushed up with the bulldozer. All trees and brush were removed from the north and east dikes and recapping of these dikes is underway at the end of the year. Remaining work to be completed during

winter and spring of 1965 includes recapping of remainder of the north dike, filling one hole in the north dike and after leveling and grading is completed these dikes will be seeded to grass.

6. Other Jobs.

Remaining brush and stumps from the clearing in Farm Unit 121, and along the south dike east of Secondary Headquarters were burned.

Stumps from clearing in Farm Unit 115 were re-piled for burning later this winter.

Installed 22" Lang pump at corner of Goose Pen.

Regular and routine repairs and maintenance to all vehicles, equipment and buildings. Major equipment repair jobs included complete overhauls of 1958 Dodge 4x4, Oliver tractor, UD-14 pump engine and all farming equipment.

Black dirt was hauled to the residence lawn and leveled out and then the lawn was reseeded in the spring.

B. Plantings.

1. Aquatic and Marsh Plants.

No marsh or aquatic plants were planted in 1964. After the drawdown of the south pool, 15 acres of a millet-buckwheat mixture and six acres of barley were planted. The millet and buckwheat developed well until reflooding which prevented development of the buckwheat seed. The barley was grazed heavily by Canada geese and goslings and was held back from maturity.

2. Trees and Shrubs.

Thirty eight white cedar (Thuja occidentalis) and 32 red barberry (Berberis canadensis) were planted around the refuge residence.

3. Upland Herbaceous Plants.

Approximately 20 acres of refuge lands were planted to a brome grass, ryegrass, alta fescue mixture. These plantings for erosion control were made on the South Dike, White Marsh dike, Riverside dike, artificial islands constructed in the pool areas, ditch banks along Farm Unit 121 and 122 and grass strips along the

final boundary right of ways. Good stands of grass has developed on all of the above mentioned areas which were planted in the first half of the growing season.

4. Cultivated Crops.

Agricultural crops were planted on 1,835 acres of refuge lands. Refuge crops and yield data are summarized in Tables 1 and 2. Seven agricultural products were produced in 1964 including corn, barley, wheat, oats, white (Navy) beans, soybeans and sugar beets. Yields were generally higher than 1963 but were offset slightly by a decline in prices. The average dollars received (gross) per acre was $91.38 as compared to $82.82 per acre in 1963.

High humidity and temperatures produced a relatively poor wheat crop when the seeds sprouted before harvesting. The Mexican bean beetle (Epilachna varivestis) was thought to have invaded the refuge white bean crop. Spraying with insecticide "Sevin" was completed by the cooperators and the infestation did not occur. This may be a serious hazard to the production of white beans in the future.

A total of 110 acres of the share of refuge produced corn was left standing in eight row strips with 16 row strips between harvested by the cooperators. Twenty-five acres of barley was left standing and was completely consumed by ducks and geese.

Cover crops planted in 1964 included ryegrass, rye and wheat mixture, and mammoth clover on 842 acres of the agricultural lands. This practice has increased on the refuge each year and provided wind erosion control, increased soil fertility, and grazing opportunities for migrating Canada geese and other waterfowl.

Acquisition of Tract Nos. 125 and 174 will increase refuge crop acreage to approximately 1,925 acres in 1965. Land capability plans for these tracts and several other recent acquisitions are being drafted by the local SCS Office. Planning for the 1965 refuge farming program with cooperators has been started.

Ninty three acres of refuge cropland, including 60 acres in Tract 125, 23 acres in Tract 136 and 10 acres in Tract 121b, was tiled at 8 rod intervals in 1964. An additional 50 acres is planned for tiling in 1965.

A meeting of the refuge staff and all farming cooperators was held in December, 1964, to discuss crop yields, future land management practices and changes in policies and regulations which will be in operation along the guidelines set up by the refuge Land Use Plan and the Wildlife Refuge Manual.

Table No. 1

Shiawassee Refuge

REFUGE CROPS - 1964

Crop	Acres	% of Total Acres
Barley	129	7.03
Corn (Field)	449	24.47
Oats	18	0.98
Soybeans	264	14.39
Sugar Beets	307	16.73
Wheat	114	6.21
White (Navy) Beans	554	30.19
Total	1835	100.00

Table No. 1 (Cont'd)

SHIAWASSEE REFUGE

CROP YIELDS - 1964

WHITE BEANS

Cooperator	Acres	C.W.T./Acre	$/C.W.T.	$/Acre
I. Almy	78	19.11	5.52	105.49
D. Boese	120	16.35	6.06	98.91
M. Boese	114	19.38	6.37	123.46
R. Bremer	65	17.27	6.35	109.66
J. Bruns	20	16.02	6.60	105.73
H. Gosen	24	15.32	6.40	98.04
A. Peaphon	53	20.60	5.93	122.16
A. Schluckebier	36	20.53	6.60	135.50
A. Simko	20	11.71	4.92	57.61
W. Wasmiller	24	18.35	6.45	118.36
Total	554	Average 17.46	6.09	107.06

SOYBEANS

Cooperator	Acres	Bushel/Acre	$/Bushel	$/Acre
D. Boese	53	39.65	2.56	98.94
M. Boese	103	29.63	2.55	75.56
R. Bremer	20	20.37	2.51	51.12
A. Peaphon	51	34.84	2.51	87.45
A. Simko	20	16.06	2.51	40.36
W. Wasmiller	17	23.23	2.51	58.31
Total	264	Average 27.18	2.52	68.62

Table No. 1 (Cont'd)

CROP YIELDS - 1964

BARLEY

Cooperator	Acres	C.W.T./Acre	$/C.W.T.	$/Acre
I. Almy	10	15.45	1.70	26.26
D. Boese	20	45.09	2.06	92.88
M. Boese	27	31.78	2.08	66.10
R. Bremer	18	29.30	1.95	57.13
H. Gosen	14	45.93	1.98	90.90
A. Peaphon	40	41.28	2.09	86.27
Total	129	Average 34.80	1.98	69.92

WHEAT

Cooperator	Acres	Bushel/Acre	$/Bushel	$/Acre
I. Almy	18	59.8	1.30	63.05
D. Boese	25	85.9	1.26	108.33
M. Boese	25	64.7	1.13	73.11
R. Bremer	16	59.8	1.00	59.80
H. Gosen	10	48.8	1.28	62.46
A. Peaphon	20	74.5	1.00	74.50
Total	114	Average 63.7	1.16	73.54

OATS

Cooperator	Acres	Bushel/Acre	$/Bushel	$/Acre
I. Almy	18	112.0	0.60	67.20

Table No. 1 (Cont'd)

CROP YIELDS - 1964

FIELD CORN

Cooperator	Acres	Bushel/Acre	$/Bushel	$/Acre
I. Almy	67	80.3	1.01	83.93
D. Boese	72	114.6	1.04	119.18
M. Boese	99	85.8	1.10	94.38
R. Bremer	43	110.4	1.01	111.50
J. Bruns	34	80.7	1.04	83.93
A. Peaphon	52	122.5	1.00	122.50
A. Schluckebier	38	92.7	1.05	97.33
W. Wasmiller	24	61.3	1.09	66.82
Total	449	Average 93.5	1.04	97.08

Total Acres 1,528 Average $ per acre = $91.38

SUGAR BEETS

Cooperator	Acres	Tons/Acre	$/Ton 1st Payment	$/Acre 1st Payment
I. Almy	82	21.4	3.27	69.98
D. Boese	68	20.5	3.51	71.95
R. Bremer	35	15.6	2.19	34.16
R. Gempel	6	21.2	3.44	72.93
H. Gosen	24	22.8	4.10	93.48
A. Peaphon	62	22.2	3.55	78.81
A. Schluckebier	30	22.3	3.82	85.18
Total	307	Average 20.8	3.41	72.36

Table No. 2

Shiawassee National Wildlife Refuge

CROP PROGRAM SUMMARY

1964

Crops	Acres	Total Yields	Yield/Acre	$/Bu./Ton/CWT	Refuge Receipts	Total Receipts
oybeans	264	8,001.1 bu.	27.18 bu.	2.52/bu.	5,763.56	20,162.77
hite Beans	554	9,978.01 cwt	17.46 cwt	6.09/cwt	13,044.90	60,766.08
arley	129	4,735.98 cwt	34.80 cwt	1.98/cwt	-	9,377.24
t	114	7,261.8 bu.	63.7 bu.	1.16/bu.	-	8,423.68
ats	18	2,016 bu.	112.0 bu.	0.60/bu.	-	1,209.60
ield Corn	449	40,415.4 bu.	93.5 bu.	1.04/bu.	-	42,032.02
ugar Beets	307	6,385.6 ton	20.8 tons	3.41/ton	7,494.29	14,988.62

APPLIED TO TILING AND TILE

Crop	Cooperator	Acres	Receipts
Field corn	J. Bruns	12	$ 572.39
White beans	M. Boese	13	483.34
White beans	J. Bruns	11	526.75
White beans	I. Almy	60	3,852.89
Total		96	$5,435.37

CROPS LEFT IN FIELD FOR WILDLIFE

Crop	Acres	Value
Field corn	74.5	$7,210.13
Barley	28.9	2,025.58
Total	103.4	$9,235.71

CROPS STORED IN REFUGE GRANARY

Crop	Acres	Bushels	Value
Field corn	10.4	1200	$1,248.00

C. Collections and Receipts.

1. Animal Specimens.

Three birds were collection, prepared, and added to the refuge collection by Assistant Manager Ellis.

Specimen	Collection Date
Catbird	May 4, 1964
Warbling Vireo	May 4, 1964
Spotted Sandpiper	May 7, 1964

2. Refuge Herbarium.

Wildlife Aid Gasaway collected, pressed and mounted 36 new plant specimens for addition to the refuge herbarium. Some of the specimens replaced worn out plants in the herbarium.

D. Control of Vegetation.

Approximately 40 pounds each of 2,4-D and 2,4,5-T was sprayed on several areas of the refuge by the use of a pickup mounted Kromer sprayer. The 2,4-D was used on refuge roads and dikes to control Canada thistle, milkweed, mustard, ragweed, and other broad-leaved weeds. There appeared to be a 100 percent top kill with a 40-60 percent regrowth. The 2,4,5-T spray was used to control willow on several dikes and farm units 153 and 161. The chemical was very effective in control. All agricultural vegetation control was completed by the cooperators at their expense.

E. Planned Burning. None this period.

F. Fires.

Fire hazard conditions on the refuge were very high during the late summer and early fall months. No fires occurred on the refuge during 1964.

IV. RESOURCE MANAGEMENT

A. Grazing. None this period.

B. Haying. None this period.

C. Fur Harvest.

The muskrat harvest, which ended January 31, 1964 was accomplished under two permits. The trappers harvested a total of 949 muskrats of the approved quota of 1,290.

Unit No.	Trapper	Trapping Quota per Unit	Number of Muskrats Harvested per Unit
2	Bouchey	125	101
3	Wyman	709	758
4 & Ditches	Bouchey	456	90
		1290	949

The refuge 40 percent share totaled 379 muskrats.

Sex and Age Ratio of Refuge Share

Adult		Juvenile	
Male	Female	Male	Female
40	42	186	111
82		297	

Ratio = 1:3.6

The refuge share of muskrats were shipped for sale to the Hudson Bay Company Fur Sales in New York on February 14 and they were sold on March 11, 1964. The net receipt from the sale totaled $621.84 or an average net price of $1.64 per muskrat which was an increase of 10 cents above the 1962-1963 fur sale price.

On December 1, the 1964-1965 muskrat harvest was started under two permits. As of December 31, 1964, a total of 708 muskrats have been trapped. Relatively mild weather during the latter part of December has hampered the trappers in their efforts.

In the 1964-1965 trapping season, the quota limitations were removed. Due to the relatively warm weather in the months of October and November, it was difficult to ascertain whether or not the peak of house construction had occurred at the time of the muskrat house census preparatory to the quota proposal. Thus, it was difficult to provide an accurate population estimate. It was decided that factors of weather, decreased water levels, decreasing muskrat population during trapping and the ability of the trapper will work together to limit the total harvest within the 75 percent recommended maximum removal.

D. Timber Removal. None this period.

E. Commercial Fishing. None this period.

V. FIELD INVESTIGATION OR APPLIED RESEARCH

A. Shiawassee Study Project No. 1.

This project, one of two wildlife management studies, was designed and conducted the first year (1964) by Assistant Refuge Manager John W. Ellis (transferred July 7, 1964). Principal objectives of this

study include life history, nesting phenology, and success of the refuge goose flock, correlation of population trends with changes in nesting habitat, determination of mortality rates and migration behavior. The study is planned to extend for a period of five years until February 28, 1969.

Due to the availability of only one year of data, results are not conclusive. However, a summary of data collected and observational generalizations will be made.

The original Canada goose flock consisted of approximately 435 semi-domestic birds. These birds were obtained from the Michigan Department of Conservation, approximately 100 geese per year, and released at three years of age. An estimated 60 pairs were nesting on the project in 1962 and 50 pairs in 1963, producing 225 and 175 goslings respectively. The study of the natural development and behavior of this flock may determine a degree of justification of the establishment of flocks of semi-domestic Canada geese in other areas.

1. Methods and Procedures.

Determination of spring arrival dates and general observations of territorial behavior were completed in March and the first three weeks in April. During the last week of April and the first week of May, a nesting survey was conducted.

Data recorded included; number of nests, clutch sizes, relation of nests to vegetational and topographic features, measurement of eggs (width and length), development of nests, and nesting behavior. A re-survey of all nesting sites was completed within one week following an observation of the first successfully hatched brood. Data were recorded as to success of hatching and possible mortality factors.

An attempt was made to trap and band goslings to determine future age classes, migration routes, and effects of hunter mortality. All goslings trapped by the use of small drive traps were sexed and banded with a standard Fish and Wildlife Service band. In addition, a white base vinyl plastic leg band with a yellow strip designating a 1964 raised gosling was attached to the right leg if female and to the left leg if male.

Other general observations of chronic mortality and possible causes, relationship with other waterfowl and feeding habits were made during the study period.

2. Results and General Conclusions.

The first Canada goose arrived on the Shiawassee Refuge on March 2, 1964. By the week of March 15-21, the resident population had increased to approximately 150 birds. Separation in

feeding and loafing from the remainder of the flock was the main factor of identification of residency. There appeared to be a very short interval between arrival and defense of a nesting site. At this time, 22 breeding pairs in active defense of a territory were censused.

The first nesting activity observed was a clutch of three eggs on an artificial island in Pool 1b on April 2, 1964. A total of 35 nests were located during the surveys. Map 1 designates the locations of 34 of the nests with the remaining nest located northwest of concentrated nesting area.

A total of 188 eggs were found with an average clutch size of 5.4 eggs. Artificial nesting islands accounted for 28 or 74% of the nest sites, while muskrat houses and feeding platforms and dikes and ditchbanks provided 2 or 6% and 5 or 20% of the nesting sites, respectively. The nest sites indicated the preference of a nesting Canada goose to be an elevated position close to water with an unobstructed view of the surrounding area.

A variety of nesting cover was utilized including smartweed (Polygonum spp.), reed canary grass, (Phalaris sp.), cattail (Typha spp.), thistle (Cirsium spp.), and trefoil (Lotus spp.). There did not appear to be any specific preference in nesting vegetation cover. But in all cases, nesting material consisted of dead vegetation of the dominant cover type at the nesting location.

Nest site locations appeared to be concentrated in the west portion of Pool 1b opposite the goose pen. There are several factors which may explain the phenomenon. During the initial stocking program, the birds were released from the goose pen. Also, the eastern portion of Pool 1b was densely covered by cattail and willow (Salix spp.) and did not provide the open nesting location preferred. The eastern portion above has recently been cleared of cattail and willow and there may be more geese nesting in this area in the future. A total of 100 eggs were measured as to length and width. Table 3 summarizes the data recorded.

Table 3 - Widths and Lengths of Canada Goose Eggs

Measurement	Average	Range
Length	85.1 mm.	78.2-98.7 mm.
Width	57.6 mm.	55.2-61.8 mm.

Map No. 1

POOL NO. 1 NEST LOCATION MAP

Shiawassee Refuge Study Project No. 1

Species: Canada Goose

Date: May 4, 1964

During the survey of nests, the relative degree of defense of nesting sites was observed and recorded. It appeared this degree of defense increased proportionately to the amount of incubation that had elapsed.

The re-survey data collected during the middle of May showed a high hatching success. Of the 188 eggs incubated, 150 or 79.8% hatched and 38 or 20.2% were either sterile or a death of an advanced embryo occurred. There did not appear to be any destruction of nests or eggs by mammalian or avian predators.

Seventy-six goslings were trapped including 35 females and 41 males. A white base yellow strip vinyl plastic band was attached to the left leg of males and the right leg of females with a standard Fish and Wildlife Service band on the opposite leg. A large portion of the goslings were trapped in the goose pen or by small portable drive traps.

There were no known losses due to disease during the year. The goslings and adult parents tended to feed away from other waterfowl particularly remaining close to the drainage ditchs. Prior to the drainage of Pool 1b in June, the goslings fed primarily in the agricultural lands of Farm Unit 121 west of the pool area. After the drawdown was completed, the family groups remained in Pool 1b feeding on sown barley, sedge (Eleocharis sp.) and invertebrate life.

This study will be continued this coming year to add data and it may provide more conclusive evidence than is available at the present time.

B. Shiawassee Study Project No. 2.

The study of the ecology of the Whistling Swan on the Shiawassee Refuge is now in its second year. The main objectives of this study include; determination of habitat preferences, migration patterns, morphological characteristics of species, sex, and age classes and origin and extent of all mortality, provide improved methods for trapping and marking swans, and correlate current and future land management practices with annual population numbers. The data presented in this report was collected by Assistant Refuge Manager John W. Ellis (Transferred July 7, 1964).

1. Population Data.

The first migrant Whistling Swans (Olor columbianus) arrived on the refuge March 7, 1964. The population reached a peak of 500 birds by March 21, 1964. Birds began leaving the refuge in large numbers the first week of April and nearly all swans had left the refuge by April 21, 1964. Populations were considerably lower

than in 1963. Weather conditions were abnormal during the first quarter of 1964 when precipitation accumulation was two inches below normal. The relatively dry spring may have caused the swans to bypass the refuge preferring flooded agricultural lands in other areas.

The 1964 annual mid-winter population survey in Michigan was conducted during the second week of January and produced a total of 314 Whistling Swans comprising 99.4% of the total Mississippi Flyway states population. Table 4 summarizes the age ratio counts made during 1964 on the refuge.

Table 4 - Whistling Swan Age Ratios

Date	Group No.	Adults	Sub-Adults	Immature	Total
3/11/64	1	2	6	6	14
3/18/64	1	2	2	1	5
3/18/64	2	2	1	5	8
3/19/64	1	1	1	3	5
3/24/64	1	36	-	15	41
3/31/64	1	55	-	18	73
4/1/64	1	59	-	27	86

2. Determination of Movements.

In an attempt to capture Whistling Swans, a cage trap was constructed in the west central portion of Pool 1b. This trap measured 50 feet long, 15 wide, and 5 feet high with a net cover (see photo section). Leads of approximately 50 feet with a funnel type entrance was baited with a corn-barley mixture. The standard cannon net trap baited with corn was used one time in a dry field. Eighteen Whistling Swans were trapped and banded in 1964 with 17 captured by the cage trap and one by the net trap.

Each captured swan was banded on the left leg with a standard Fish and Wildlife Service metal band and a two inch yellow vinylite plastic band was attached to the right leg. A few drops of acetone was used to seal the plastic band. An additional yellow vinylite plastic neck band was placed on each bird.

Dyeing of the breast and neck was completed by placing the swan in a burlap bag with only the parts to be dyed exposed and the head covered and then a solution of snythetic Dupont Rhodamine B extra red dye was applied with a paint brush. Each bird remained in the bag for approximately one hour to allow for drying and then released in Pool 1b.

After banding and dyeing of the swans was completed, the Regional Office was informed and they contacted Bureau, State, and Canadian biologists and other field observers of the marked birds and requested observation notes. Table 5 and Map 2 summarizes six observation reports received.

Table 5 - Sight Location of Whistling Swans Marked at Shiawassee Refuge

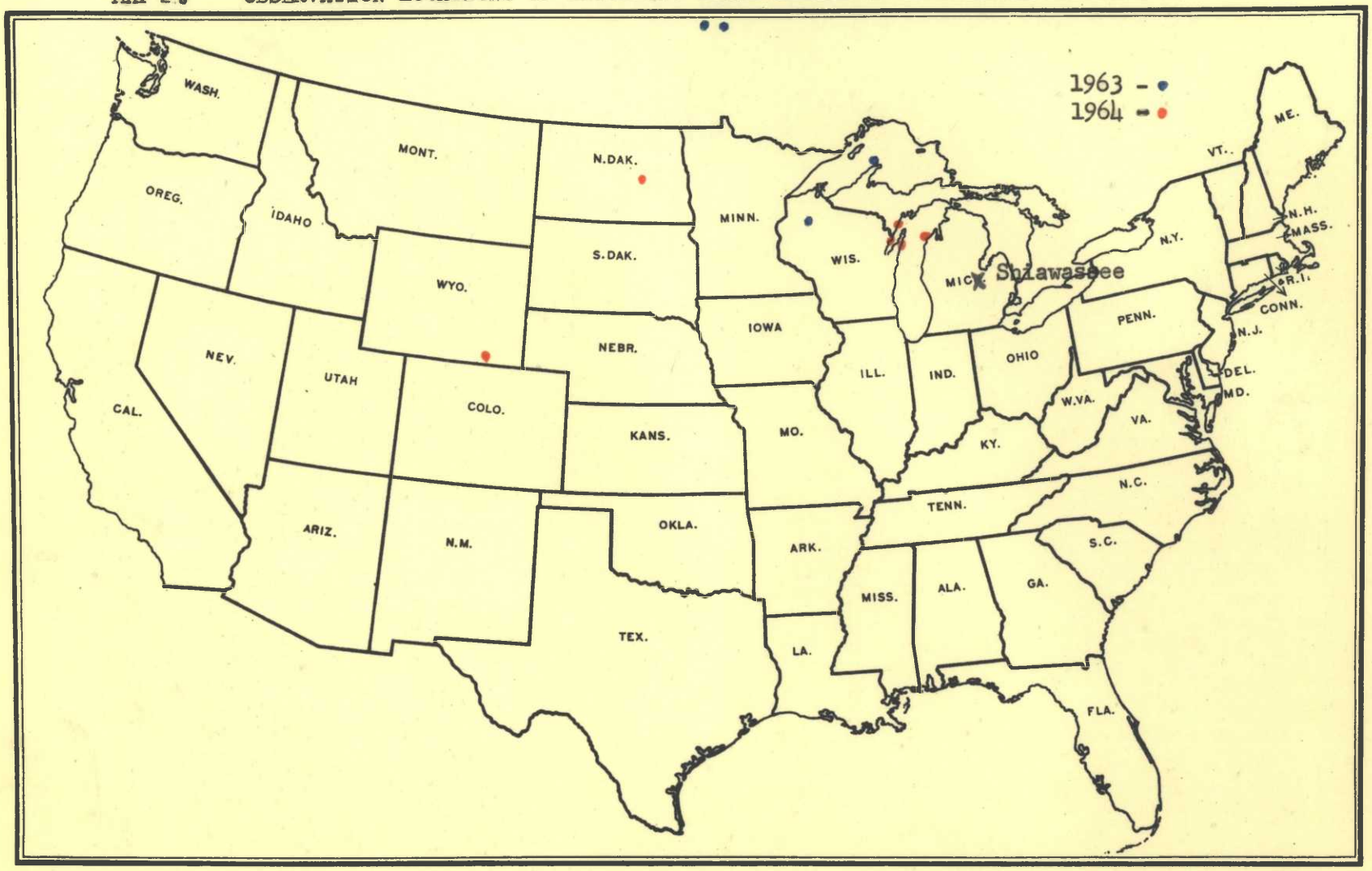
Observation No.	Date Observed	Location
1.	April 12, 1964	Ingallston, Menominee County, Michigan
2.	April 12, 1964	Manistee Lake, Filer City, Michigan
3.	April 12, 1964	Peshtigo Harbor, Wisconsin
4.	April 18, 1964	Oconto County, Wisconsin
5.	April 25, 1964	Pole Creek Reservoir, Cheyenne, Wyoming
6.	May 4, 1964	Sibley Lake National Wildlife Refuge, North Dakota

3. Behavior.

During the early stages of migration, no pattern of feeding flights was observed. As migration population increased definite patterns of feeding was observed. The swans fed consistently in the early morning hours and late evening hours in Farm Unit 121 and loafing in the pool area and intermittent feeding occurred during the remaining daylight hours. Although swans prefer flooded croplands, they will feed in dry stubble fields if needed as has been observed on the refuge in previous years. It appeared as competition with geese and other waterfowl increased, the swans tended to move to the state game area adjacent to the refuge for feeding purposes. Corn comprised the staple of their diet with rye grass and succulent winter wheat making up the balance. During the latter portion of the migration period, after the major portion of the corn had been consumed, aquatic vegetation became the main portion of the swan diet until departure.

Courtship display was commonly observed during feeding periods and was less definite during loafing.

MAP 2. OBSERVATION LOCATIONS OF WHISTLING SWANS MARKED AT SHIAWASSEE REFUGE 1963 & 1964



4. Additional Information.

a. Morphological Characteristics and Observations.

Measurements were made on the 18 captured swans before banding and data are summarized in Table 6.

b. Disease Investigations.

Two dead Whistling Swans and one sick bird were found during the migration. These birds were taken to the Rose Lake Wildlife Research Center of the Michigan Conservation Department for a post-mortem examination.

None of the swans had lead fragments in the gizzard and there were no pathologic lesions on the internal organs. No determination was made as to the cause of death. These three birds were the only observed losses during migration.

C. Marsh Transect Survey.

In the past, the continuity of transect data has not been strong enough to provide reliable conclusive data. Destruction of and eventual relocation of quadrat markers have also depleted the accuracy of the data. During July and August, Wildlife Aid Gasaway set up a new transect system involving the line intercept method proposed by Dr.W. Green in "Suggested Procedure For Sampling Vegetation". Nine line intercept transects replaced some of the old transects or sample new areas. A permanent stake, of $1\frac{1}{2}$ inch pipe painted red, marks the beginning of each transect. The bearing and number of quadrats in each transect have been recorded and are in the refuge files. The new transects will be run starting the last week in July and terminating not later than the first week in August. It is felt that this new system will provide reliable accurate data upon which a water management plan involving control of vegetation may be completed.

VI. PUBLIC RELATIONS

A. Recreational Uses.

With the return of the migrant waterfowl, visitor use increased ~~increased~~ rapidly during the spring monghs with most people interested in seeing the geese and swans. Sixty-eight one day permits were issued for viewing wildlife through June, when use tapered off. This was in addition to week-end guided tours conducted between mid-March and the end of May. One day permits were again issued in the fall for observation of geese until shortly before opening of the hunting season. No visitor permits have been issued since the first of October.

Table No. 6

1964 - WHISTLING SWAN - MORPHOLOGICAL CHARACTERISTICS AND OBSERVATIONS

Bird No.	1	2	3	4	5	6	7	8	9
Band Number	509-20712	509-20713	509-20714	509-20715	509-20716	509-20717	509-20718	509-20719	509-20720
Total Weight (lbs. - oz.)	12-4	13-7	13-15	10-12	13-7	11-3	15-4	11-6	14-4
Age *	Immature	Adult	Adult	Sub-Adult	Adult	Immature	Adult	Adult	Adult
Sex	Female	Male	Male	Female	Female	Female	Male	Female	Female
Bursa of Fabricus	Absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent
1. Depth (mm)	-	-	-	-	-	19	-	-	-
Oviduct	Open	-	-	Closed	Open	Closed	-	Open	Open
Penis									
1. Diameter (mm)	-	6.7	5.8	-	-	-	6.9	-	-
2. Length (mm)	-	14.7	14.1	-	-	-	13.8	-	-
3. Small & Corkscrew	-	No	No	-	-	-	No	-	-
4. Sheathed	-	Yes	Yes	-	-	-	Yes	-	-
5. Color (pink, translucent)	-	Pink	Pink	-	-	-	Pink	-	-
6. Appearance (Wrinkled)	-	Smooth	Smooth	-	-	-	Wrinkled	-	-
Sphincter Muscle									
1. Diameter (mm)	17.2	11.6	12.2	13.4	14.2	13.6	16.3	13.5	14.8
2. Shape	Flat	Convex	Convex	Convex	Convex	Convex	Convex	Convex	Flat
3. Color (flesh pink)	Yes	Yes	Yes	Yes	Yes	Yes	Purple	Yes	Yes
Wing & Primary Feathers									
1. Wing length (cm)	55.8	52.2	56.3	50.0	53.8	49.9	55.4	52.2	53.4
2. Length of 1st primary **(cm)	36.1	29.3	32.7	29.4	31.7	27.8	30.6mm	30.1mm	31.0
3. Median width of 1st primary (mm)	20.7	20.5	25.7	20.0	18.4	24.9	21.7	21.7	20.5
4. Degree of wear 1st primary ***	Pointed	Obtuse	Obtuse	Pointed	Obtuse	Obtuse	Obtuse	Obtuse	Obtuse
Spur Wing									
1. Feathered or bare	Feathered	Feathered	Feathered	Feathered	Feathered	Feathered	Feathered	Feathered	Feathered
2. Knobby or smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Knobby	Smooth	Smooth
Breast & Belly Feathers									
1. Average width (mm)	28.9	25.9	24.6	20.6	20.5	15.1	22.7	22.4	21.6
2. Incubation patch	None	None	None	None	None	None	None	None	None

Table No. 6 (Cont'd)

Bird No.	1	2	3	4	5	6	7	8	9
Tail Feathers									
1. No. Rectrices (right-left)	-	-	-	-	-	-	-	-	-
2. Notched Rectrices	-	Unnotched	Unnotched	Unnotched	Unnotched	Unnotched	Unnotched	Unnotched	Unnotched
3. Molt replacement	None	None	None	None	None	None	None	None	None
4. Length longest rectrice (cm)	15.3	16.4	16.7	13.4	15.8	12.3	12.9	14.9	16.4
5. Median width vane of longest rectrice (mm)	28.7	32.2	28.1	31.1	32.4	20.5	19.1	28.7	35.6
The Legs									
1. Diameter Tarsus mid-point ****(mm)	22.3	23.7	21.4	21.9	22.8	20.3	21.3	20.3	21.1
2. Total length Tarsus (mm)	133.5	127.4	136.8	137.9	133.4	129.5	140.8	133.4	140.4
The Bill									
1. Total length of bill (mm)	90.6	88.9	91.1	86.5	91.4	89.4	98.9	92.6	94.6
2. Width of bill at nostrils (mm)	31.8	31.4	32.5	29.3	32.6	33.1	32.9	31.0	32.7
3. Width of nail	8.8	19.0	19.2	21.7	21.1	19.9	21.0	19.4	17.6
4. Distance of nostril from tip of bill (mm)	41.8	40.4	41.7	38.0	42.4	40.7	46.4	38.3	41.8
5. Yellow spot in lore	Present	Present	Present	Present	Present	Absent	Present	Present	Present
6. Length of yellow spot (mm^2)	129.7	111.65	113.14	104.34	112.2	-	220.48	197.10	83.25
7. Color of bill	Black	Black	Black	Black	Black	Reddish	Black	Black	Black
General Characteristics									
1. Body temperature (degrees)	105.1	106.8	105.8	103.6	106.4	107.2	104.0	105.8	103.6
2. Time elapsed from capture to temperature recording	-	-	-	-	-	-	-	-	-
3. Physiological state of bird when temperature recorded	-	-	-	-	-	-	-	-	-
4. Color of head & neck	White	White	White	White	White	Gray	White	White	White

* Immature = Up to 1 year of age
Sub-adult = 1-3 years of age
Adult = 3+ years of age

** Distal Primary

*** Wear determined from tips of primaries

**** Diameter taken at lateral dimension of Tarsus

Table No. 6 (Cont'd) 1964 - WHISTLING SWAN - MORPHOLOGICAL CHARACTERISTICS AND OBSERVATIONS

Bird No.	10	11	12	13	14	15	16	17	18
Band Number	509-20721	509-20722	509-20723	509-20724	509-20725	509-20726	509-20727	509-20728	509-20729
Total Weight (lbs. - oz.)	13.8	9.3	10.3	11.6	14.10	13.3	13.15	12.8	10.7
Age *	Immature	Immature	Adult	Adult	Adult	Adult	Adult	Sub-adult	Immature
Sex	Female	Female	Female	Female	Male	Male	Male	Male	Male
Bursa of Fabricus	Present	Present	Absent	Absent	Absent	Present	Absent	Absent	Present
1. Depth (mm)	14	29	-	-	-	-	-	-	29
Oviduct	Closed	Closed	Closed	Open	-	-	-	-	-
Penis									
1. Diameter (mm)	-	-	-	-	5.4	3.4	5.9	4.0	3.9
2. Length (mm)	-	-	-	-	10.9	5.0	11.5	10.8	4.2
3. Small & Corkscrew	-	-	-	-	No	No	No	No	-
4. Sheathed	-	-	-	-	Yes	Yes	Yes	Yes	-
5. Color (pink, trsnslucent)	-	-	-	-	Purple	Pink	Pink	Pink	Pink
6. Appearance (Wrinkled)	-	-	-	-	-	Smooth	Wrinkled	Smooth	Smooth
Sphincter Muscle									
1. Diameter (mm)	13.8	14.2	15.4	14.6	14.6	12.5	12.2	13.5	13.0
2. Shape	Convex	Convex	Convex	Convex	Convex	Convex	Convex	Convex	Convex
3. Color (flesh pink)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wing & Primary Feathers									
1. Wing length (cm)	52.5	48.0	52.6	50.1	54.6	51.5	55.2	51.8	51.1
2. Length of 1st primary ** (cm)	29.5	28.0	31.0	Damaged	30.7	29.2	31.0	30.7	28.8
3. Median width of 1st primary (mm)	21.8	21.7	19.7	21.9	25.3	18.7	23.5	20.5	22.8
4. Degree of wear 1st primary ***	Pointed	Pointed	Obtuse	Obtuse	Obtuse	Pointed	Obtuse	Obtuse	Pointed
Spur Wing									
1. Feathered or bare	Feathered	Feathered	Feathered	Feathered	Feathered	Feathered	Feathered	Feathered	Feathered
2. Knobby of smooth	Smooth	Smooth	Smooth	Smooth	Knobby	Smooth	Smooth	Smooth	Smooth
Breast & Belly Feathers									
1. Average width (mm)	15.5	20.0	17.8	22.6	27.4	20.9cm	25.8	24.4	15.9
2. Incubation patch	None	None	None	None	None	None	None	None	None

Table No. 6 (Cont'd)

Bird No.	10	11	12	13	14	15	16	17=	18
Tail Feathers									
1. No. Rectrices (Right-left)	-	-	-	-	-	-	-	-	-
2. Notched Rectrices	-	-	-	Unnotched	Unnotched	-	Unnotched	Unnotched	-
3. Molt replacement	None	None	None	None	None	None	None	None	12.1cm
4. Length longest rectrice (cm)	12.6	12.1	13.3	14.1	16.6	14.2	16.6	15.9	24.1mm
5. Median width vane of longest rectrice (mm)	22.7	29.3	40.0	32.3	28.6	31.9	43.0	43.6	-
The Legs									
1. Diameter Tarsus mid-point****(mm)	23.0	19.8	20.2	19.7	22.4	19.5	21.9	21.7	19.7
2. Total length Tarsus (mm)	134.1	123.1	127.8	133.1	141.2	141.6	140.0	132.4	130.2
The Bill									
1. Total length of bill (mm)	93.0	88.5	94.1	86.6	92.4	98.6	95.2	90.2	88.0
2. Width of bill at nostrils (mm)	33.0	30.0	32.0	32.5	33.9	31.4	32.3	30.0	31.0
3. Width of nail (mm)	20.2	20.0	21.0	17.3	20.3	20.3	18.5	20.0	18.4
4. Distance of nostril from tip of bill (mm)	48.8	40.4	43.0	37.9	42.2	45.2	43.0	40.0	39.7
5. Yellow spot in lore	Present	Absent	Present	Present	Present	Present	Present	Present	Absent
6. Length of yellow spot (mm^2)	-	-	111.60	101.52	55.29	100.40	45.78	84.50	-
7. Color of bill	Black	Black	Black	Black	Black	Black	-	-	Speckled pink
General Characteristics									
1. Body temperature (degrees)	105.1	104.4	-	105.0	104.0	104.6	104.4	105.0	-
2. Time elapsed from capture to temperature recording	-	-	-	-	-	-	-	-	-
3. Physiological state of bird when temperature recorded	-	-	-	-	-	-	-	-	-
4. Color of head & neck	Gray	Gray	White	White	White	White	White	White	Gray

* Immature = Up to 1 year of age
Sub-adult = 1-3 years of age
Adult = 3+ years of age

** Distal P rimary

*** Wear determined from tips of primaries

**** Diameter taken at lateral dimension of Tarsus

Carp fishermen, anglers and archers, were present in slightly below usual numbers during spring months along road ditches, county drains and Ferguson Bayou. Very low water levels restricted this activity in 1964.

The hiking trail, located in the woods area on the east side of the refuge and maintained by a local Boy Scout Troop, received heavy use during the summer and early fall.

B. Refuge Visitors.

Frequent refuge visitors during the year included farming cooperators, U.S. Game Management Agents Meyerding and McClure, Michigan Department of Conservation Officers John Harris and Ernest Spycher and Al Boelter, Area Forester, M.C.D.

Official Visitors are listed as follows:

Date	Name	Affiliation	Purpose
Jan. 6	Marvin Cooley	M. C. D., Lansing	Goose Management
	Ted Black	M. C. D., Rose Lake	Goose Management
	Vic Jansen	M. C. D., Lansing	Goose Management
20	Ed. Larie	FWS, Realty, Mpls. Minn.	Acquisition
Feb. 24	John Hakala	FWS, Seney Refuge	Student Interview
	Peter Suich	FWS, Seney Refuge	Equip. Transfer
	George Orlich	FWS, Seney Refuge	Equip. Transfer
Mar. 2	Ed. Larie	FWS, Realty, Mpls. Minn.	Acquisition
7	R. Griefe	Saginaw Audubon Club	Bird Migration
	Dennis Wheel	Saginaw Audubon Club	Bird Migration
23	Bill Gasaway	M. S. U. Student	Orientation
24	Ethel Staudacher	Bay City Audubon Club	Bird Migration
	Paula Lavoy	Bay City Audubon Club	Bird Migration
25	Pauline Innes	Washington, D. C.	Swan Info & Photo
30	Bill Gustafson	Saginaw Daily News	Swan Photos
Apr. 3	Hal. Harrington	Teacher, Saginaw	Cons. Programs
6	Ed. Larie	FWS, Realty, Mpls. Minn.	Acquisition
7	George Hunt & Class	U. of M. Ann Arbor	Tour
16	Jim Thompson	Public Health Service	Detergent Pollution
	Carl Fatterol	Mich. Water Resources Comm.	Detergent "
27	Fant Martin	FWS, Patuxent W. R. Center	Woodcock Survey
29	Andy Amman	M. C. D., Lansing	Woodcock Survey
May 12	Art Hawkins	FWS, Mpls. Minn.	Courtesy Call
	Ed. Mikula	M. C. D., Lansing	Courtesy Call
	Donald Douglas	M. D. D., Lansing	Courtesy Call
18	James Salyer	FWS, Refuges, Mpls. Minn.	Master Planning
19	Charles Schick	Extension Serv., Lansing	Courtesy Call
	James Halm	Extension Serv., Saginaw	Courtesy Call
21	Leo Brieske	G.S.A., Chicago, Ill.	Gov't Vehicles
22	R. Pytell	U. S. Attorney, Detroit	Land Condemnation
27	Ed. Trecker	FWS, Refuges, Mpls. Minn.	Recreation Plans

Date	Name	Affiliation	Purpose
June 1	Frank Martin	FWS, Refuges, Mpls. Minn.	Land Condemnation
	Ed. Larie	FWS, Realty, Mpls. Minn.	Land Condemnation
16	Frank Martin	FWS, Refuges, Mpls. Minn.	Inspection Tour
	Mr. & Mrs. C. Fermanich	FWS, Refuges, Wash. D. C.	Inspection Tour
July 7	Frank Martin	FWS, Refuges, Mpls. Minn.	Meeting w/M.C.D.
20	William Long	Mich. Water Resources Comm.	Water Samples
21	Ed. Larie	FWS, Realty, Mpls. Minn.	Acquisition
Aug. 5	Frank Martin	FWS, Refuges, Mpls. Minn.	Master Planning
	C. A. Hughlett	FWS, Refuges, Mpls. Minn.	Master Planning
	Louis Kowalski	FWS, Engineering, Mpls.	Master Planning
	Ed. Stevenson	FWS, Engineering, Mpls.	Master Planning
Aug. 6	Miles Pirnie	M. S. U., East Lansing	Banding Obs.
	Alvin Black	S. C. S. Dist. Supv.	Tour
	Warner Law	S. C. S. Dist. Supv.	Tour
	Wilber Graham	S. C. S. Dist. Supv.	Tour
	Norris Hubbell	S. C. S. Dist. Supv.	Tour
	LaVerne Wisenberger	S. C. S. Dist. Supv.	Tour
	Ben Wallace	S. C. S., Saginaw	Tour
	Harlan Steffens	S. C. S., Saginaw	Tour
	Tony Pasionek	S. C. S., Saginaw	Tour
	Don Morse	S. C. S., Saginaw	Tour
Aug. 11	William Green	FWS, Winona, Minn.	Plant Transects
19	Ed. Collins	FWS, Necedah Refuge	Visiting Fireman
Sept. 17	Joe Bryant	Canadian Wildlife Service	Visit
Oct. 5	Ron Hoffman	M. S. U. Student	Duck Intes. Tracts
21	Frank Martin	FWS, Refuges, Mpls. Minn.	Rental Survey
27	John Winship	FWS, Refuges, Mpls. Minn.	Aerial Photos
28	Herb Miller	M. C. D., Lansing	Courtesy Call
30	John Winship	FWS, Refuges, Mpls. Minn.	Aerial Photos
Nov. 4	Ed. Larie	FWS, Realty, Mpls. Minn.	Acquisition
24	Rudolph Boehringer	U. S. Probation Officer	Violations
28	Ed. Collins	FWS, Necedah Refuge	Visiting Fireman
Dec. 30	Ralph Town	FWS, Lake Andes, S. Dakota	Visiting Fireman

C. Refuge Participation.

1. Refuge Tours.

March 7 - Saginaw Audubon Club (Frye)

21 - Midland Boy Scout Troop (Frye)

24 - Arthur Hill High School Biology Class (Frye & Ellis)

26 - Hemlock Public School (Frye & Ellis)

31 - Dye Jr. High School, Flint, Biology Classes (Frye & Ellis)

April 3 - Cub Scouts (Poma)

4 - Chippewa Valley Audubon Club, Alma (Ellis)

7 - U of M Wildlife Life Histories Class (Frye & Ellis)

8 - Cub Scouts, Pack 80 (Poma)

10 - Chesaning 6th Grade Class (Poma)

14 - North School Cub Scouts (Poma)

15 - Frankenmuth Cub Scouts (Poma)

16 - Hempton School Cub Scouts, Pack 39 (Poma)

17 - St. Thomas Aquinas Cub Scouts, Pack 12 (Poma)

21 - Midland Cub Scouts, Pack 58 (Poma)

21 - Cub Scouts, Pack 46, Saginaw (Poma)

24 - Bridgeport Cub Scouts, Pack 5 (Poma)

30 - Cub Scouts, Mershon School (Frye)

May 7 - Hemmeter School 4th Grade (Frye)

8 - Clio Area Jr. High School Biology Classes (Frye, Ellis)

21 - 800 4-H Club boys and girls (All Refuge Personnel)

June 24 - Michigan State University Teachers Workshop (Frye)

August 6 - Saginaw County Soil Conservation Dist. Directors (Frye)

12 - YMCA - 200 boys (Frye)

October 6 - Mackinaw Middle School 6th Grade (Frye & Anderson)

7 - Chippewa School 7th Grade Conservation Class (Frye, Anderson)

Not listed are guided tours for week-end visitors in March and April for viewing the geese and swans.

2. Meetings.

January 24 - Frye, with Regional Supervisor Carpenter and Chief, Refuge Division, Gillett, met in Wyandotte, Michigan with City Officials, Corps of Engineers personnel and U. S. Congressman John Dingall on recreation planning for Wyandotte Refuge.

March 4 - Frye attended Bureau Communications Workshop in Lansing.

March 10 - Frye met with Saginaw V. A. Hospital personnel officer for wage rates survey information.

June 8 - Frye, Ellis, Poma and Robinson attended information meeting on FTS telephone system at Saginaw V. A. Hospital.

July 7 - Frye, with Assistant Refuge Supervisor Martin met with Michigan Conservation Department regarding management and acquisition problems for Shiawassee Project.

November 7 - Frye attended annual meeting of Michigan Bird Banders Association at Oakland University and gave slide talk on swan trapping at Shiawassee Refuge.

December 15 - Frye and Anderson conducted meeting with all farming cooperators at refuge headquarters.

December 15 - Frye met with Boy Scout Troop 42 to outline conservation projects.

December 22 - Frye met with Saginaw County Board of Supervisors concerning division of refuge receipts between Townships with refuge lands.

Monthly meetings of the Saginaw County Agricultural Council were attended by Frye and Ellis through May, and by Frye and Anderson September through December. Frye was elected Secretary-Treasurer for 1965 at the December meeting.

Refuge personnel were in attendance at several meetings of the Saginaw Field and Stream Club during the year.

During the fall months, Frye cooperated with State personnel in periodic aerial waterfowl surveys of Saginaw Bay area, Lake St. Clair and lower Detroit River area.

3. Slide Talks.

January 8 - Hemlock, Michigan J.C.'s (Frye)

February 24 - Hemlock, Michigan Lions Club (Ellis)

February 24 - University of Michigan Wildlife Seminar (Frye & Hakala)

February 25 - Michigan State University Fisheries & Wildlife Club (Frye and Hakala)

March 3 - Riverside Kiawanis Club (Frye)

March 11 - Saginaw Valley Radio Control Club (Frye)

March 20 - Midland, Michigan Boy Scouts (Frye)

March 25 - Four one hour talks to Dye Jr. High School Biology Classes in Flint, Michigan (Frye)

March 30 - Grand Blanc, Michigan DeMolay (Ellis)

April 9 - Bridgeport Elementary School 4th Grade Science Classes (Frye)

April 16 - Saginaw Senior Citizens (Ellis)

July 29 - Northwest Kiwanis Club (Poma)

August 18 - South Saginaw Golden Age Club (Frye)

October 5 - Sheridan Ave. Methodist Church Mens Club (Frye)

October 13 - Saginaw U. S. Army Reserve Personnel (Frye)

October 20 - Hemmeter School 4th Grade Classes (Frye)

October 22 - Saginaw Optimist Club (Frye)

October 30 - Mackinaw School 6th Grade Class (Frye)

November 3 - Michigan State University Forestry Club (Frye)

4. Student Interviews.

Refuge Managers Frye (Shiawassee) and Hakala (Seney) with assistance from Regional Personnel Officer Larson, conducted student interviews for summer Wildlife Aid positions and permanent positions with the Bureau at University of Michigan on February 25 and at Michigan State University on February 26.

D. Hunting.

Hunting was prohibited on the refuge in 1964 except from November 15 to November 30 when the taking of white-tailed deer under current Federal and State regulations was permitted on a portion of the refuge. The open area consisted of approximately 3,000 acres on the eastern helf of the refuge made up of bottomland hardwoods interspersed with agricultural lands. An estimated 800 man-days of deer hunting produced a kill of about 25 male deer and an illegal kill of about 25 female deer.

The hunting season on Canada geese was closed by the State of Michigan over an area of 66,000 acres encircling both the refuge and the Shiawassee Flats State Game Area in 1964 and will continue through 1965 and 1966. This restriction was an attempt to reduce hunting pressure on the resident flock and thus increase the number of birds using the refuge areas for the greatest length of time. In the past, an estimated 90 percent of the geese taken were birds of the resident flock and the kill apparently exceeded the annual production. Thus, the closure of this area and the increase in use by migrant geese may help to build the resident flock for hunting after 1966.

Waterfowl hunting pressure other than geese was fairly high during the early part of the season in and around the state game area. An estimate of the waterfowl kill is unavailable at the present time.

E. Violations.

One rubbish dumping on refuge lands violation was prosecuted on August 28 by the Michigan State Police before a local Justice of the Peace. The subject pleaded guilty and was fined $20.00 and court costs of $4.30 and ordered to clean up the rubbish pile he created.

In May, it was learned that illegal cutting of merchantible timber was taking place on refuge lands. The cutting was being done by the former land owner who had rights to the timber for five years following sale of the land on September 23, 1957. However, the expiration date of this right was September 23, 1962. The value of the timber cut was estimated at $737.74 by a Forester of the Michigan Department of Conservation. Timber cutting was immediately terminated and an investigation started. This case has been referred to the Regional Office for further action.

At the writing of this report, 18 violation cases are in the process of being prosecuted in the Federal District Court. These violations include 11 cases of hunting on closed refuge lands and seven cases of trespassing on closed refuge lands. All defendants have pleaded guilty and are waiting sentencing.

State Officer Harris and Mechanic Robinson apprehended five persons for hunting waterfowl before sunrise, two persons for hunting waterfowl after sunset, one person for hunting waterfowl with unplugged shotgun, and two persons for possession of an illegally taken deer. All ten cases were prosecuted in the local Justice of the Peace court and resulted in fines of $141.60 and court costs of $73.00. Excellent cooperation with the Michigan State Conservation Officers in the area was received throughout the year.

F. Safety.

The Station Safety Committee, Ellis, Poma, and Robinson, set up safety meeting schedules and regular monthly safety meetings were held through the year as below listed.

January 6 - Review of past accidents and discussion of Federal Tort claims act, conducted by Frye.

February 10 - Motor vehicles, use, travel, regulations, etc. conducted by Poma.

March 2 - Accident Reporting, conducted by Ellis.

April 6 - Draglines, cranes, etc., conducted by Robinson.

May 4 - Tractors, bulldozers, etc., conducted by Mayle.

June 1 - Fire prevention, suppression, etc., conducted by M.C.D. District Fire Officer Niffennigger, arranged by Snider.

July 27 - Boat Safety, arranged by Shelley, conducted by Mr. Fuller of U. S. Coast Guard Auxiliary.

On the job safety discussions throughout the rest of the year completed the safety schedules. One accident occurred during the year. Wildlife Aid Gasaway got foreign materials in his eye during banding operations requiring medical attention. No lost time. The Station Safety Record now stands at 4,147 days without a lost time accident.

VII. OTHER ITEMS

A. Trips.

January 5 - 10 - Ellis to Poynette, Wisconsin to participate in annual "Wing Bee".

March 17 - Frye to Wyandotte, Michigan to inspect surplus U. S. Coast Guard buildings and land for possible use in administration of Wyandotte Refuge.

April 3 - Frye and Ellis delivered dead and sick swans to Rose Lake Wildlife Research Station, Lansing, Michigan, for autopsy.

April 3 - Snider, with Agent Meyerding, to Gilbraltor, Michigan, to pick up semi-domestic mallards.

April 12 - 24 - Frye to Denver, Colorado, for Supervisory Training Course.

May 13 - Frye to Detroit Metropolitan Airport regarding aerial photos of refuges by Air National Guard.

August 25 - 27 - Frye to Agassiz Refuge for banding workshop.

September 29 - 30 - Anderson and Snider to Algonac to post Lake St. Clair closed area.

October 2 - Frye and Robinson to post Wyandotte Refuge.

October 26-November 6 - Anderson to Swan Lake Refuge to assist in Canada goose transfer program.

November 24 - Robinson and Mayle to Wyandotte Refuge to pick up buoys.

December 2 - Anderson and Mayle to Lake St. Clair to pick up buoys.

December 7 - 10 - Anderson and Frye, with Agents McClure and Meyerding to Allegan, Michigan, on goose patrol for season closing.

During the year several trips were made to Detroit Tank Plant, Grosse Ile Naval Air Station and Selfridge Air Force Base to screen and/or pick up surplus property items. In addition trips were made to Crane, Indiana for a tractor w/mower and to Fort Sheridan, Illinois for a hydroseeder and spreader-mulcher.

B. Personnel Changes.

John Ellis was promoted to GS-9 and transferred to Agassiz Refuge as Assistant Refuge Manager on July 7, 1964.

Edward W. Anderson received appointment as Assistant Refuge Manager and reported for duty on September 8, 1964. Ed is a graduate of Colorado State University and received his Master's degree from the University of Michigan. He came to Shiawassee following a summer as Wildlife Aid at Lower Souris Refuge.

C. Land Acquisition.

Three large tracts were acquired during the year, bringing federal ownership to just under 6,400 acres of the planned total of 8,800 acres. Purchase options have been secured on four other tracts also.

Condemnation proceedings had been filed for the three tracts acquired. Two were settled out of court, and the third, the Johnson Tract, No. 114,a, went to trial, but was settled during court proceedings.

D. Photographs.

The photographs appended to this report were taken with refuge equipment and processed in the refuge darkroom.

E. Credits.

Frye: Sections I, II A, III A, VI A, B, C; and VII.

Anderson: Sections II B, C, D, E, F, G, H, I; III B, C, D, E, F; IV; V; and VI D, E.

Poma: Typing and assembling.

SIGNATURE PAGE

Submitted by:

John R. Frye
(Signature)
John R. Frye

Date: February 1, 1965

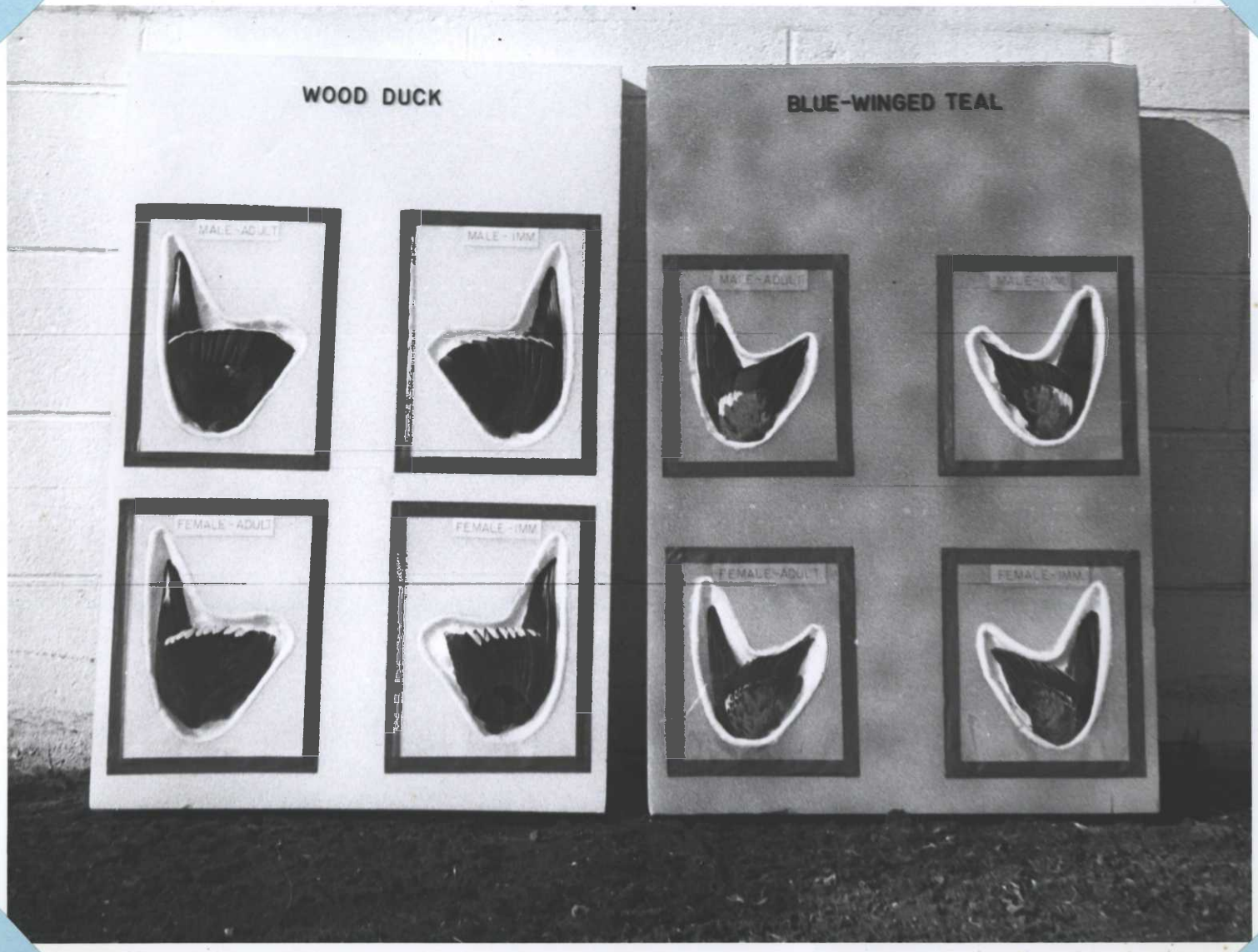
Refuge Manager
Title

Approved, Regional Office:

Date: 2/11/65

Frank S. Martin
(Signature)

Asst.
Regional Refuge Supervisor



Duck wing mounts for display and education in species identification. Mounted on styrofoam blocks. Photo 64-17, 3/12/64, JRF.

John Ellis received $25.00 incentive award for his idea for the refuge herbarium. Photo 64-49, 3/18/64, SSP.

Cage trap for capturing swans in Pool 1A. Baffled compartments with open top prevents swans from flying out but permits geese and ducks to escape. 3/27/64, DH.

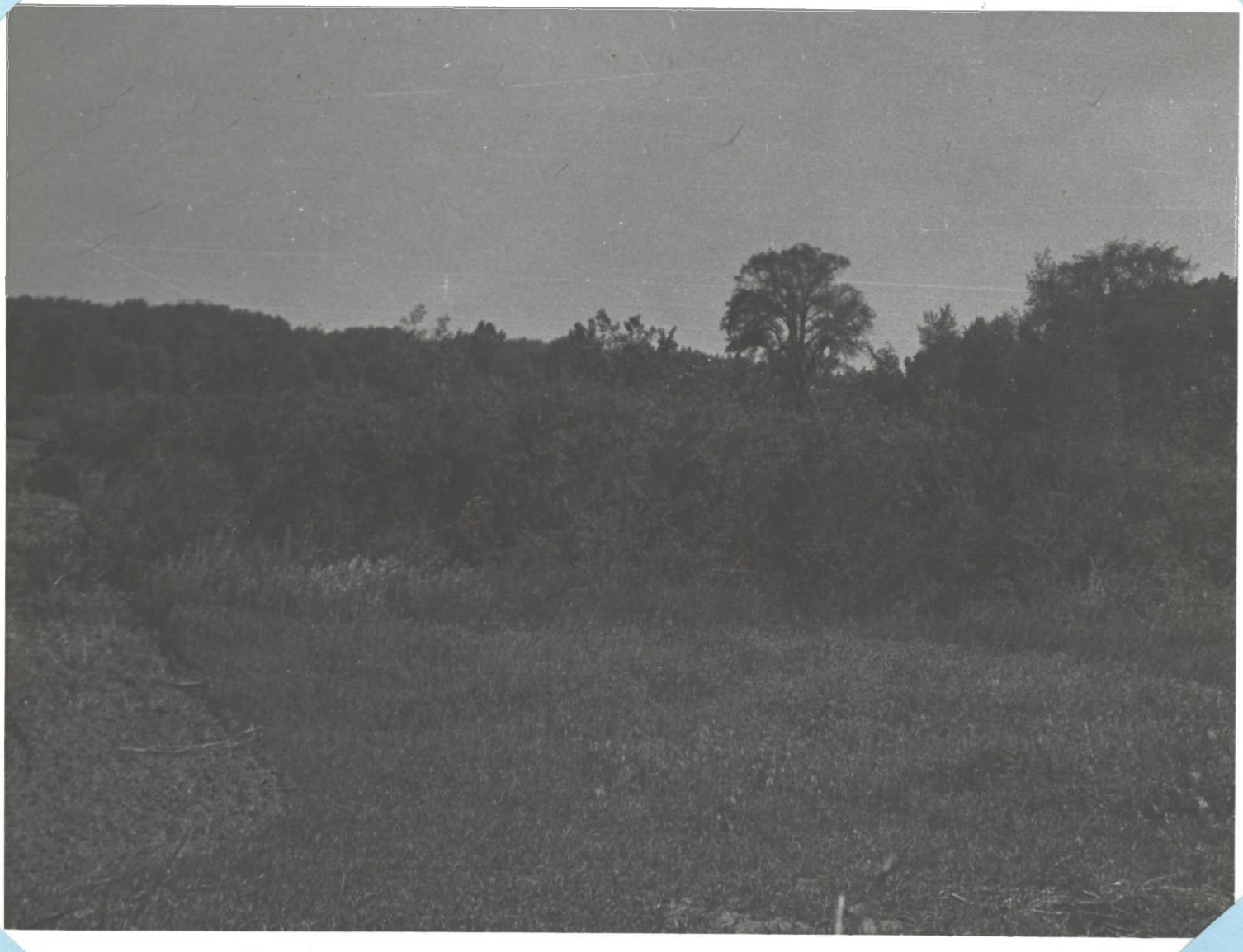
Ellis removing swan from cage trap in Pool 1A. All swans except one were captured in cage traps in 1964. 3/27/64, DH.

Experimental tile drains were installed in Pool 1b during drawdown. Tile drains will spped future drawdowns and facilitate reflooding through pre-saturation of bottom soils. Photo 64-123, 7/2/64, JRF

Volunteer annual plants in Pool 1B were disced down with "Rome" plow prior to reflooding. Photo 64-124, 7/2/64, JRF.

Cattail stands in Pool 1b were removed or opened up using breaking plow.
Photo 64-132, 7/28/64, JRF.

Remains of cattail stand after once over with breaking plow. Plants up to 7 ft. tall turned completely under. Photo 64-135, 7/28/64, JRF



Willow thickets at east end of Pool 1b prior to control.
Photo 64-139, 8/6/64, JRF

Willows were dozed out to open the east end of Pool 1b for increased waterfowl utilization. Photo 64-141, 8/6/64, JRF

Southwest corner of Pool 1B during reflooding. This area was tiled and seeded to millet, buckwheat, and barley and received heavy waterfowl use. During reflooding the water worked up the tile lines, pre-saturating soils, and surface flooding was quicker in this area of the pool. Photo 64-192, 10/16/64, JRF.

Nesting tubs for Canada Geese placed in Pool 1b. Tub is the end of surplus jet engine container. This is not a charcoal grill.
Photo 64-13, 3/9/64, JWE

Eat-out in sugar beets by deer on adjoining private lands. Refuge deer were the cause - naturally. Photo 64-184, 10/15/64, JRF

Deer damage to sugar beet. Tops were pawed off and deer ate beets to ground level, and below ground level. Photo 64-186, 10/15/64, JRF

Canada geese again fed exclusively on sugar beet residues early in the fall, as first observed in 1963. Photo 64-205, 9/18/64, JRF

"Kristi" Muskeg Traveller picked up for Seney Refuge from surplus. Minor problems apparent. Tracks float out from under hull - no adjustments. Recommended for immediate disposal. Photo 64-99, 6/5/64, LDR